

CLAIMS

1. A power amplifying apparatus comprising:

a switch unit that is supplied with a power supply voltage V_c and includes a series circuit of a high-side switch and a low-side switch; and

a control unit that operates the switch unit in accordance with the input AC signal V_i in a cycle with a predetermined ratio of ON and OFF periods to drive a load connected to a connection point between the high-side switch and the low-side switch,

the control unit including:

a pulse modulation unit that receives the input AC signal V_i , generates a pulse signal from the input AC signal V_i at a predetermined modulation sensitivity, and outputs the pulse signal;

an arithmetic unit that detects a DC voltage component (E_c) from the power supply voltage V_c , and that multiplies the modulation sensitivity by a ratio (V_c/E_c) of the power supply voltage (V_c) to the DC component (E_c) or multiplies the input AC signal V_i by a ratio (E_c/V_c) of the DC component (E_c) to the power supply voltage (V_c); and

a drive unit that drives the switch unit on the basis of the pulse signal.

2. The power amplifying apparatus according to claim 1, wherein the switch unit has a full bridge configuration which has two series circuits connected in parallel, each of series circuits includes high-side switch and a low-side switch, and the load is connected between the connection points between the high-side switches and the low-side switches in the series circuits.

3. The power amplifying apparatus according to claim 1, further comprising a stabilizing power supply unit that can control the DC voltage component, the power supply voltage being supplied
5 from the stabilizing power supply unit.

4. The power amplifying apparatus according to claim 3, wherein the stabilizing power supply unit has a function that controls the DC component of the power supply voltage to control a
10 signal gain which is a ratio of the input AC signal V_i to the output AC signal V_o .

5. The power amplifying apparatus according to claim 4, wherein
15 the arithmetic unit has a series circuit of a plurality of resistors including a variable resistor that is substantially connected to both terminals of the switch unit, and a low-pass filter connected to a first connection point between the resistors arranged on a lower potential side than the variable resistor,

20 the pulse modulation unit has a triangular wave voltage generation circuit, the triangular wave voltage generation circuit receiving a potential of a second connection point arranged on the lower potential side of the variable resistor and the potential of the first connection point, and generates a triangular wave voltage
25 having an amplitude equal to a potential difference between the first connection point and the second connection point, and compares the triangular wave voltage with the input AC signal to generate a pulse signal, and

the stabilizing power supply unit controls an output
30 voltage of the low-pass filter to control the DC component E_c of the

power supply voltage.

6. The power amplifying apparatus according to claim 1, wherein

5 the arithmetic unit multiplies a predetermined voltage by the ratio (V_c/E_c) to output the voltage, and

the pulse modulation unit has a triangular wave voltage generation circuit that generates a triangular wave voltage V_t having an amplitude equal to an output voltage from the arithmetic unit, and compares the triangular wave voltage V_t with the input AC
10 signal V_i to generate the pulse signal.

7. The power amplifying apparatus according to claim 6, wherein

15 the arithmetic unit has

a first current source circuit that generates a first current depending on the power supply voltage V_c ,

a second current source circuit that generates a second current obtained from the first current through a low-pass
20 filter,

a constant current source circuit that supplies a predetermined current,

a first transistor in which the first current flows as a collector current;

25 a second transistor in which the second current flows as a collector current,

a third transistor in which the predetermined current flows as a collector current, and

a fourth transistor, and

30 the first transistor and the third transistor are

connected to each other such that the respective base-emitter voltages are added to each other,

the second transistor and the fourth transistor are connected to each other such that the respective base-emitter
5 voltages are added to each other,

the respective transistors are connected such that both the added voltages are equal to each other, thereby outputting a voltage depending on a collector current flowing in the fourth transistor.

10

8. A power amplifying apparatus wherein a switch is driven by a pulse signal generated by modulating an input AC current signal at a modulation sensitivity multiplied by the ratio (V_c/E_c) of a power supply voltage V_c to a DC voltage component E_c of the supplied
15 power supply voltage V_c .

9. The power amplifying apparatus according to claim 8, wherein the switch is driven by a pulse signal which depends on a comparison result of the input AC signal and a triangular wave
20 voltage, and the amplitude of the triangular wave voltage is equal to a voltage obtained by multiplying the ratio (V_c/E_c) of the power supply voltage V_c to the DC voltage component E_c of the power supply voltage V_c by a predetermined voltage.

25 10. A power amplifying apparatus, wherein a switch is driven by a pulse signal which depends on an input AC signal multiplied by a ratio (E_c/V_c) of a DC voltage component E_c of a power supply voltage V_c to the supplied power supply voltage V_c .